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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF	:
TETSUJIRO KONDO, ET AL.	: EXAMINER: THIRUGNANAM, G.
SERIAL NO: 10/552,467	:
FILED: OCTOBER 7, 2005	: GROUP ART UNIT: 2624
FOR: IMAGE PROCESSING DEVICE, IMAGE PROCESSING METHOD, AND PROGRAM	:

APPEAL BRIEF

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

This is an Appeal of the Final Office Action dated August 14, 2009 (herein, the FA), which finally rejected Claims 1-16. A Notice of Appeal from the FA was timely filed on November 16, 2009.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is the Assignee, Sony Corporation.

II. RELATED APPEALS AND INTERFERENCES

Appellants' legal representative and Assignee are aware of no appeals which will directly effect or be directly effected by or have any bearing on the Board's decision in this appeal.

III.   STATUS OF THE CLAIMS

Claims 1-16 are pending in the application, and Claims 1-16 stand finally rejected by

the FA.

The rejection of Claims 1, 8, 15 and 16 is appealed herewith. A clean copy of

pending Claims 1-16 is attached in the claims appendix. Claims 1, 8, 15 and 16 recite

parallel subject matter, and therefore stand or fall together.

IV.   STATUS OF THE AMENDMENTS

No amendment was filed after the FA of August 14, 2009.

V.   SUMMARY OF THE CLAIMED SUBJECT MATTER

Claim 1 is directed to an apparatus (e.g., apparatus 20, see Fig. 5 and p. 14, l. 22 – p.

16, l. 17) for processing an image. The apparatus includes motion vector detection means

(e.g., motion vector detection section 30, see Fig. 5 and p. 14, l. 26 – p. 15, l. 3) for detecting

a motion vector about a moving object that moves in multiple images (see p. 14, l. 26 – p. 15,

l. 3), each of the multiple images being made up of multiple pixels and acquired by an image

sensor having time integration effects (see p. 14, l. 26 – p. 15, l. 3), and tracking the moving

object (see Figs. 24A-24C and 25A-25F, and p. 47, l. 1 – p. 48, l. 17). The apparatus also

includes a motion-blurring-mitigated object image generation means (e.g., motion-blurring

mitigated object image generation section 40, see Fig. 5 p. 15, l. 3 – p. 16, l. 2) for generating

a motion-blurring-mitigated object image in which motion blurring of the moving object is

mitigated using the motion vector detected by the motion vector detection means (see p. 15, l.

3 – p. 16, l. 2). The apparatus of Claim 1 also includes an output means (e.g., output section

50, see Fig. 5 and p. 16, ll. 3-17) for combining the motion-blurring-mitigated object image

generated in the motion-blurring-mitigated object image generation means into a space-time

location in each of the multiple images based on the motion vector detected by the motion

vector detection means, to output it as a motion-blurring-mitigated image (see Figs. 24A-25F

and p. 47, l. 1 – p. 48, l. 17).

Independent Claim 8 is directed to a method for processing an image performed by an

image processing apparatus (e.g., apparatus 20, see Fig. 5 and p. 14, l. 22 – p. 16, l. 17). The

method includes: detecting a motion vector about a moving object that moves in multiple

images (see p. 14, l. 26 – p. 15, l. 3), each of the multiple images being made up of multiple

pixels and acquired by an image sensor having time integration effects (see p. 14, l. 26 – p.

15, l. 3), and tracking the moving object (see Figs. 24A-24C and 25A-25F, and p. 47, l. 1 –

p. 48, l. 17); generating a motion-blurring-mitigated object image in which motion blurring of

the moving object is mitigated using the motion vector detected in the motion-vector-

detecting step (see p. 15, l. 3 – p. 16, l. 2); and combining the motion-blurring-mitigated

object image generated in the motion-blurring-mitigated-object-image-generating step into a

space-time location in each of the multiple images based on the motion vector detected in the

motion-vector-detecting step, to output it as a motion-blurring-mitigated image (see Figs.

24A-25F and p. 47, l. 1 – p. 48, l. 17).

Independent Claim 15 is directed to memory (e.g., ROM 62, RAM 62, etc., see Fig.

17 and p. 37, ll. 4-12) including a program (see p. 37, ll. 5-6) for allowing a computer (e.g.,

CPU 61, see Fig. 17 and p. 37, ll. 4-6) to perform a method for processing an image,

comprising: detecting a motion vector about a moving object that moves in multiple images

(see p. 14, l. 26 – p. 15, l. 3), each of the multiple images being made up of multiple pixels

and acquired by an image sensor having time integration effects (see p. 14, l. 26 – p. 15, l. 3),

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and tracking the moving object (see Figs. 24A-24C and 25A-25F, and p. 47, l. 1 – p. 48, l. 17); generating a motion-blurring-mitigated object image in which motion blurring of the moving object is mitigated using the motion vector detected in the motion-vector-detecting step (see p. 15, l. 3 – p. 16, l. 2); and combining the motion-blurring-mitigated object image generated in the motion-blurring-mitigated-object-image-generating step into a space-time location in each of the multiple images based on the motion vector detected in the motion-vector-detecting step, to output it as a motion-blurring-mitigated image (see Figs. 24A-25F and p. 47, l. 1 – p. 48, l. 17).

Independent Claim 16 is directed to an apparatus (e.g., apparatus 20, see Fig. 5 and p. 14, l. 22 – p. 16, l. 17) for processing an image. The apparatus of Claim 16 includes a detector (e.g., motion vector detection section 30, see Fig. 5 and p. 14, l. 26 – p. 15, l. 3) configured to detect a motion vector about a moving object that moves in multiple images (see p. 14, l. 26 – p. 15, l. 3), each of the multiple images being made up of multiple pixels and acquired by an image sensor having time integration effects (see p. 14, l. 26 – p. 15, l. 3), and configured to track the moving object (see Figs. 24A-24C and 25A-25F, and p. 47, l. 1 – p. 48, l. 17). The apparatus of Claim 16 also includes a processor (e.g., CPU 61, see Fig. 17 and p. 37, ll. 4-6) configured to (e.g., motion-blurring mitigated object image generation section 40, see Fig. 5 p. 15, l. 3 – p. 16, l. 2) generate a motion-blurring-mitigated object image in which motion blurring of the moving object is mitigated by using the motion vector (see p. 15, l. 3 – p. 16, l. 2). The apparatus of Claim 16 further includes and an output section (e.g., output section 50, see Fig. 5 and p. 16, ll. 3-17) configured to combine the motion-blurring-mitigated object image into a space-time location in each of the multiple images

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based on the motion vector detected at the detector, to output it as a motion-blurring-

mitigated image (see Figs. 24A-25F and p. 47, l. 1 – p. 48, l. 17).

VI.   GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The grounds of rejection to be reviewed on appeal are (A) whether the features of

Claims 1, 8, 15 and 16 comply with the written description requirement under 35 U.S.C. §

112, first paragraph; and (B) whether Claims 1, 8, 15 and 16 are unpatentable under 35

U.S.C. § 103(a) over Kondo et al. (PG Pub. 2004/0021775, herein Kondo '775) in view of

Burt et al. (U.S. Pat. 5,999,662, herein Burt).

VII.   ARGUMENTS

A.   The originally filed disclosure provides clear support for each of the features recited
     in independent Claims 1, 8, 15 and 16.

The FA rejects Claims 1, 8, 15 and 16 under 35 U.S.C. § 112, first paragraph,

asserting that the specification fails to provide support for the feature of "... combining the

motion-blurring-mitigated object image ... into a space-time location in each of the multiple

images ..."

As disclosed in an exemplary embodiment at p. 15, l. 18 – p. 16, l. 17 of the originally

filed disclosure, a motion-blurring-mitigated object image generation section 40 specifies a

region or calculates a mixture ratio based on the motion vector MVC, the processing region

information HZ, and the image data DVa and uses the calculated mixture ratio to separate

foreground component (e.g., moving object to be tracked) and background component from

one other. Further, the motion-blurring-mitigated object image generation section 40

performs a motion blurring adjustment on an image of the separated foreground component

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to generate a motion-blurring-mitigated object image. The foreground component image data DBf (e.g., the moving object being tracked) that is image data of the motion-blurring-mitigated object image acquired by this motion-blurring adjustment is supplied to the output section 50. Image data DBb of the separated background component is also supplied to the output section 50. The output section 50 combines an image of foreground region in which motion blurring based on the foreground component image data DBf (e.g., the moving object being tracked) onto a background image based on the background component image data DBb, thereby generating image data DVout and outputting it.

In this regard, Appellants note that the bottom of p. 2 of the Advisory Action of November 4, 2009 (herein, the AA) references p. 16 of the specification and notes that DBf (e.g., the moving object being tracked) corresponds to a "motion-blurring mitigated object image". (emphasis added) Further, the abstract of the disclosure states that the motion-blurring-mitigated object image generation section generates "image data DBf of a motion-blurring-mitigated object image" and Fig. 7 shows that DBf is the output of the motion blurring adjustment section 44. Therefore, as acknowledged in the AA, and as disclosed throughout the specification, DBf is one identifier that corresponds to the image data of the motion-blurring-mitigated object image being tracked. Another identifier that corresponds to the motion-blurring-mitigated object image is OBf, which will be discussed below in the specific embodiment of tracking a moving object.

Pp. 2-4 of the AA also acknowledges that the specification clearly provides support for the claimed feature of combining the motion-blurring-mitigated object image into a space-time location in the image from which it was extracted, or in another image, based on a detected motion vector. Therefore, the basis of contention appears to be whether the

specification provides support for the claimed feature of combining the same motion-blurring-mitigated object image into subsequent, or multiple, images (i.e. "each of the multiple images").

In this regard. p. 16, ll. 7-17 of the specification states

> In this case, the foreground region image, which is the motion-blurring-mitigated object image, can be combined into a space-time position that corresponds to the detected motion vector MVC, to *output a motion-blurring-mitigated object image of the moving object to a position that tracks the moving object*. That is, when the motion vector is detected using at least first and second images that occur successively in time, *a motion-blurring-mitigated object image of the moving object is combined into a position of a target pixel in an image or a position that corresponds to a target pixel in the other image, both positions of which correspond to this detected motion vector*. (emphasis added)

Therefore, the specification discloses that the motion-blurring-mitigated object image is output to a position that *tracks the moving object*, and that the motion-blurring-mitigated object image *of the moving object* is combined into the image of the object being tracked *in both images*, and the placement of the motion-blurring-mitigated object image in *both positions correspond to this detected motion vector*.

Therefore, this cited portion of the specification alone clearly provides support for the claimed feature of "... combining the motion-blurring-mitigated object image ... into a space-time location in each of the multiple images ..."

Moreover, Figs. 24A-25F and p. 47, l. 1 – p. 48, l. 17 further expands on the above noted feature by disclosing that even when the moving object OBf moves in an order of Figs. 24A, 24B, and 24C (e.g. clearly a progression of OBf through a time sequence of images), motion blurring of this moving object OBf has been mitigated as tracking it (i.e. OBf) through each of the time sequence of images.

P. 5 of the AA appears to concede that the above noted portion of the specification does appear to describe a process of combining OBf into each of a plurality of sequential images to track the image, but asserts that OBf does not correspond to a "motion-blurring mitigated object image". Specifically, the AA asserts that "[t]he Examiner disagrees that the 'it' refers to the 'motion-blurring-mitigated object image' ... [t]he 'it' refers to the moving object OBf" ... [t]he first instance of motion-blurring-mitigated object is after the word 'it', so 'it' must correspond to the moving object OBf." Appellants respectfully traverse this assertion, as OBf corresponds to both the moving object, as well as the motion-blurring mitigated image of the moving object.

Particularly, p. 47, ll. 1-11 of the specification discloses

Meanwhile, in the above embodiments, *motion blurring of an moving object OBf is mitigated to output its image*, so that, as shown in FIG. 24 even when the moving object OBf moves in an order of FIGS. 24A, 24B, and 24C, *motion blurring of this moving object OBf has been mitigated as tracking it*, thereby *outputting a good image thereof in which motion blurring of this moving object OBf has been mitigated*.

Therefore, the AA concedes that the image being "tracked" (e.g. combined into subsequent images) in the above noted portion of the specification is OBf. As discussed above, OBf corresponds to the image data of the motion-blurring-mitigated object image. While the specification does at times refer to OBf as being the moving object, the context of the specification clearly discloses that OBf also corresponds to the object image after motion-blurring-mitigation of the image data has occurred.

Accordingly, the process of tracking the motion-blurring-mitigated object image through an order of images, as discussed above, clearly provides support for the feature of "... combining the motion-blurring-mitigated object image ... into a space-time location in each of the multiple images ...", as recited in independent Claims 1, 8, 15 and 16.

Further, with respect to the written description requirement, there is no *in haec verba* requirement, and claim limitations may be supported by the specification through *express, implicit, or inherent* disclosure.[1] To satisfy the written description requirement, a patent specification must describe the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention.[2]

If a skilled artisan would have understood the inventor to be in possession of the claimed invention at the time of filing, even if every nuance of the claims is not explicitly described in the specification, then the adequate description requirement is met. See, e.g., *Vas-Cath*, 935 F.2d at 1563, 19 USPQ2d at 1116; *Martin v. Johnson*, 454 F.2d 746, 751, 172 USPQ 391, 395 (CCPA 1972) *(stating "the description need not be in ipsis verbis [i.e., "in the same words"] to be sufficient")*.

The analysis of whether the specification complies with the written description "is conducted from the standpoint of one of skill in the art. Generally, there is an inverse correlation between the level of skill and knowledge in the art and the specificity of disclosure necessary to satisfy the written description requirement."[3]

Moreover, the MPEP discusses several factors that must be considered in order to make a 112, first paragraph, rejection for lack of written description. The MPEP states:

> Whether the specification shows that applicant was in possession of the claimed invention is not a single, simple determination, but rather is a factual determination reached by considering a number of factors. Factors to be considered in determining whether there is sufficient evidence of possession include the level of skill and knowledge in the art, partial structure, physical and/or chemical properties, functional characteristics alone or coupled with a known or disclosed correlation between structure and function, and the method of making the claimed invention.

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[1] MPEP § 2163.
[2] *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555 (Fed. Cir. 1991).
[3] Page A-7 of the USPTO's *Written Description Training Materials*, revision 1, March 25, 2008.

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The description needed to satisfy the requirements of 35 U.S.C. 112 "varies with the nature and scope of the invention at issue, and with the scientific and technologic knowledge already in existence." Capon v. Eshhar, 418 F.3d at 1357, 76 USPQ2d at 1084.

* * * *

Thus, an inventor is not required to describe every detail of his invention. An applicant's disclosure obligation varies according to the art to which the invention pertains. Disclosing a microprocessor capable of performing certain functions is sufficient to satisfy the requirement of section 112, first paragraph, when one skilled in the relevant art would understand what is intended and know how to carry it out.").[4]

The FA fails to provide any explicit analysis as to the above-noted factors, which are pertinent to a determination of compliance with the written description requirement. Thus, the FA has failed to set forth a *prima facie* case of failing to comply with the written description requirement.

Further, as noted above, the specification does explicitly describe the feature of "... combining the motion-blurring-mitigated object image ... into a space-time location in each of the multiple images ..." Thus, a person of ordinary skill in the art would recognize that the inventor was in possession of the claimed invention at the time of filing and the written description requirement is satisfied.

Accordingly, Appellants respectfully request that the rejection of Claims 1, 8, 15 and 16 under 35 U.S.C. § 112, first paragraph, be reversed.

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[4] MPEP §2163, emphasis added.

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B. Independent Claims 1, 8, 15 and 16 patentably define over Kondo '775 and Burt

Independent Claim 1, for example, recites, *inter alia*, an apparatus for processing an image, said apparatus comprising:

> motion vector detection means for detecting a motion vector about a moving object that moves in multiple images ... and tracking the moving object;
> motion-blurring-mitigated object image generation means for generating *a motion-blurring-mitigated object image* in which motion blurring of the moving object is mitigated using the motion vector detected by the motion vector detection means; and
> output means for combining *the motion-blurring-mitigated object image* ... into *a space-time location in each of the multiple images* based on the motion vector detected by the motion vector detection means, to output it as a motion-blurring-mitigated image.

Independent Claims 8 and 15-16, while directed to alternative embodiments, recite similar features.

In rejecting Claim 1, p. 5 of the FA concedes that Kondo '775 fails to disclose "combining the motion-blurring-mitigated object image ... into a space time location in each of the multiple images". In an attempt to remedy this deficiency, the FA cites Fig. 9 of Burt noting "where from a sequence of frames a foreground (residuals) (moving object) is extracted, which is then combined with a mosaic of background frames".

More particularly, Fig. 9 and col. 14, l. 28 – col. 17, l. 10 of Burt describes a process of separating background and residual images so that a static background mosaic 904 can be generated by combining the separated background images. As described at col. 15, ll. 7-20 of Burt, this static background mosaic 904 is a single image that is used for purposes of searching through scenes and extracting a single frame of interest. Thus, the static background mosaic 904 is a single image, and Burt fails to teach or suggest that the separated residual images are added back into the static background mosaic 904, whatsoever.

Moreover, even if the separated residual images in <u>Burt</u> were to be added back into the static background mosaic 904, this process would include adding the individual residual images separated from each frame into the static background mosaic 904. Thus, this process would include adding <u>a plurality of residual images</u> into the <u>single</u> static background mosaic 904. This process is the opposite of that recited in Claim 1, which specifies "combining *the motion-blurring-mitigated object image* ... into a space time location in *each of the multiple images*". <u>Burt</u>, on the other hand, at best, possibly describes adding a plurality of extracted residual images into a single background image.

<u>Kondo</u> '775, therefore, even if combined with <u>Burt</u>, fails to teach or suggest "generating *a* motion-blurring-mitigated object image" and "combining *the* motion-blurring-mitigated object image ... into *a space-time location in each of the multiple images* based on the motion vector detected by the motion vector detection means", as recited in amended independent Claim 1.

Accordingly, Appellants respectfully request that the rejection of Claim 1 under 35 U.S.C. § 103 be reversed. For substantially similar reasons, it is also submitted that independent Claims 8, 15 and 16 patentably define over <u>Kondo</u> '775 and <u>Burt</u>.

C.   <u>As Claims 2-7 and 9-14 ultimately depend from one of independent Claims 1 and 8, these claims also patentably define over the applied references.</u>
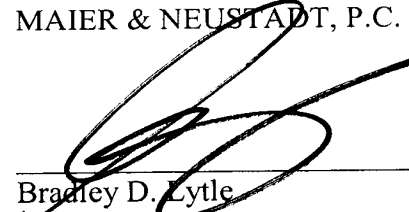
As discussed above, the combination of <u>Kondo</u> '775 and <u>Burt</u> fails to teach or suggest specific features recited in independent Claims 1 and 8. Likewise, neither <u>Wang</u> nor <u>Kondo</u> '539 remedy the above-mentioned deficiencies of <u>Kondo</u> '775 and <u>Burt</u>. Therefore, none of the cited references, alone or in combination, teach or suggest Appellant's Claims 2-7 and 9-14, which include the limitations of one of Claims 1 and 8 by virtue of dependency.

VIII. CONCLUSION

For the above reasons, it is respectfully requested that all the rejections still pending

in the FA be REVERSED.

Respectfully submitted,

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CLAIMS APPENDIX

1. An apparatus for processing an image, said apparatus comprising:

motion vector detection means for detecting a motion vector about a moving object that moves in multiple images, each of the multiple images being made up of multiple pixels and acquired by an image sensor having time integration effects, and tracking the moving object;

motion-blurring-mitigated object image generation means for generating a motion-blurring-mitigated object image in which motion blurring of the moving object is mitigated using the motion vector detected by the motion vector detection means; and

output means for combining the motion-blurring-mitigated object image generated in the motion-blurring-mitigated object image generation means into a space-time location in each of the multiple images based on the motion vector detected by the motion vector detection means, to output it as a motion-blurring-mitigated image.

2. The apparatus for processing the image according to claim 1, wherein the motion vector detection means sets a target pixel corresponding to a location of the moving object in any one of at least a first image and a second image, which are sequential in terms of time, and detects a motion vector corresponding to the target pixel by using the first and second images; and

wherein the output means combines the motion-blurring-mitigated object image into a location of the target pixel in said one of the images or a location corresponding to the target pixel in the other image, said locations corresponding to the detected motion vector.

3. The apparatus for processing the image according to claim 1, wherein in a processing region of the image, the motion-blurring-mitigated object image generation means

turns into a model so that a pixel value of each pixel in which no motion blurring corresponding to the moving object occur becomes a value obtained by integrating the pixel value in a time direction with the pixel being moved corresponding to the motion vector and generates a motion-blurring-mitigated object image in which motion blurring of the moving object included in the processing region is mitigated, based on the pixel value of the pixel in the processing region.

4. The apparatus for processing the image according to claim 3, wherein the motion-blurring-mitigated object image generation means includes:

region identification means for identifying a foreground region, a background region, and a mixed region in the processing region, said foreground region being composed of only a foreground object component constituting a foreground object which is moving object, said background region being composed of only a background object component constituting a background object, and said mixed region mixing the foreground object component and the background object component;

mixture ratio detection means for detecting a mixture ratio of the foreground object component and the background object component in the mixed region;

separation means for separating at least a part of region of the image into the foreground object and the background object, based on the mixture ratio; and

motion-blurring-adjusting means for mitigating motion blurring of the foreground object separated by the separation means based on the motion vector.

5. The apparatus for processing the image according to claim 3, wherein the motion vector detection means detects the motion vector every pixel in the image; and

wherein the motion-blurring-mitigated object image generation means sets the processing region according to the motion vector of the target pixel in the image so that the processing region includes the target pixel, and outputs pixel value in which motion blurring of the target pixel is mitigated in pixel units based on the motion vector of the target pixel.

6. The apparatus for processing the image according to claim 1, further comprising expanded image generation means for generating an expanded image based on the motion-blurring-mitigated image,

wherein the output means outputs the expanded image to a location corresponding to the motion vector in a time direction.

7. The apparatus for processing the image according to claim 6, wherein the expanded image generation means includes:

movement class determination means for extracting multiple pixels corresponding to a target pixel in the expanded image from the motion-blurring-mitigated image and determining a movement class corresponding to the target pixel based on a pixel value of the extracted multiple pixels;

storage means for storing predictive coefficients each for predicting a target pixel from multiple pixels in a first image, said multiple pixels corresponding to a target pixel in a second image, said predictive coefficients being obtained by learning between the first and second images every movement class, said first image having number of pixels corresponding to the motion-blurring-mitigated image, and said second image having number of pixels more than that of the first image; and

predictive value generation means for detecting the predictive coefficients each corresponding to the movement class detected by the movement class detection means from

the storage means, extracting the multiple pixels corresponding to the target pixel in the expanded image as a predictive tap from the motion-blurring-mitigated image, and generating a predictive value corresponding to the target pixel according to one-dimensional linear combination of the predictive coefficients detected from the storage means and the predictive tap.

8. A method for processing an image performed by an image processing apparatus, said method comprising:

motion-vector-detecting step of detecting a motion vector about a moving object that moves in multiple images, each of the multiple images being made up of multiple pixels and acquired by an image sensor having time integration effects, and tracking the moving object;

motion-blurring-mitigated-object-image-generating step of generating a motion-blurring-mitigated object image in which motion blurring of the moving object is mitigated using the motion vector detected in the motion-vector-detecting step; and

output step, performed by a processor of said image processing apparatus, of combining the motion-blurring-mitigated object image generated in the motion-blurring-mitigated-object-image-generating step into a space-time location in each of the multiple images based on the motion vector detected in the motion-vector-detecting step, to output it as a motion-blurring-mitigated image.

9. The method for processing the image according to claim 8, wherein the motion-vector-detecting step sets a target pixel corresponding to a location of the moving object in any one of at least a first image and a second image, which are sequential in terms of time, and detects a motion vector corresponding to the target pixel by using the first and second images; and

wherein the output step combines the motion-blurring-mitigated object image into a location of the target pixel in said one of the images or a location corresponding to the target pixel in the other image, said locations corresponding to the detected motion vector.

10. The method for processing the image according to claim 8, wherein in a processing region of the image, the motion-blurring-mitigated-object-image-generating step turns into a model so that a pixel value of each pixel in which no motion blurring corresponding to the moving object occur becomes a value obtained by integrating the pixel value in a time direction with the pixel being moved corresponding to the motion vector and generates a motion-blurring-mitigated object image in which motion blurring of the moving object included in the processing region is mitigated, based on the pixel value of the pixel in the processing region.

11. The method for processing the image according to claim 10, wherein the motion-blurring-mitigated-object-image-generating step includes:

region identification step of identifying a foreground region, a background region, and a mixed region in the processing region, said foreground region being composed of only a foreground object component constituting a foreground object which is moving object, said background region being composed of only a background object component constituting a background object, and said mixed region mixing the foreground object component and the background object component;

mixture-ratio-detecting step of detecting a mixture ratio of the foreground object component and the background object component in the mixed region;

separation step of separating at least a part of region of the image into the foreground object and the background object, based on the mixture ratio; and

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motion-blurring-adjusting step of mitigating motion blurring of the foreground object separated in the separation step based on the motion vector.

12. The method for processing the image according to claim 10, wherein the motion-vector-detecting step detects the motion vector every pixel in the image; and

wherein the motion-blurring-mitigated-object-image-generating step sets the processing region according to the motion vector of the target pixel in the image so that the processing region includes the target pixel, and outputs pixel value in which motion blurring of the target pixel is mitigated in pixel units based on the motion vector of the target pixel.

13. The method for processing the image according to claim 8, further comprising expanded-image-generating step of generating an expanded image based on the motion-blurring-mitigated image,

wherein in the output step, the expanded image is output to a location corresponding to the motion vector in a time direction.

14. The method for processing the image according to claim 13, wherein the expanded-image-generating step includes:

movement class-determining step of extracting multiple pixels corresponding to a target pixel in the expanded image from the motion-blurring-mitigated image and determining a movement class corresponding to the target pixel based on a pixel value of the extracted multiple pixels;

storing step of storing predictive coefficients each for predicting a target pixel from multiple pixels in a first image, said multiple pixels corresponding to a target pixel in a second image, said predictive coefficients being obtained by learning between the first and

second images every movement class, said first image having number of pixels

corresponding to the motion-blurring-mitigated image, and said second image having number

of pixels more than that of the first image; and

predictive-value-generating step of detecting, in the storing step, the predictive

coefficients each corresponding to the movement class detected in the movement class-

detecting step, extracting the multiple pixels corresponding to the target pixel in the expanded

image as a predictive tap from the motion-blurring-mitigated image, and generating a

predictive value corresponding to the target pixel according to one-dimensional linear

combination of the predictive coefficients detected in the storing step and the predictive tap.

15. A memory including a program for allowing a computer to perform a method for

processing an image, comprising:

detecting a motion vector about a moving object that moves in multiple images, each

of the multiple images being made up of multiple pixels and acquired by an image sensor

having time integration effects, and tracking the moving object;

generating a motion-blurring-mitigated object image in which motion blurring of the

moving object is mitigated by using the motion vector; and

combining the motion-blurring-mitigated object image into a space-time location in

each of the multiple images based on the detected motion vector to output it as a motion-

blurring-mitigated image.

16. An apparatus for processing an image, said apparatus comprising:

a detector configured to detect a motion vector about a moving object that moves in

multiple images, each of the multiple images being made up of multiple pixels and acquired

by an image sensor having time integration effects, and configured to track the moving

object;

a processor configured to generate a motion-blurring-mitigated object image in which

motion blurring of the moving object is mitigated by using the motion vector; and

an output section configured to combine the motion-blurring-mitigated object image

into a space-time location in each of the multiple images based on the motion vector detected

at the detector, to output it as a motion-blurring-mitigated image.

17-20. (Canceled)

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.